Name: KEY Hour: _____ Score: _____ Practice

Probability and Statistics Practice Quiz

1. How many different ~~four-letter~~ permutations are there for the letters in the word "divide?"

$\frac{6!}{2!2!} = \frac{6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 1 \cdot 2 \cdot 1} = 60$ ~~60~~ 180

2. A drawer contains 3 red socks, 5 white socks, and 8 blue socks. Without looking, you draw out a sock and then draw out a second sock without returning the first sock. What is the probability that the first sock and the second sock are both blue?

1st $\frac{8}{16}$ 2nd $\frac{7}{15}$

$\frac{8}{16} \cdot \frac{7}{15} = \frac{1}{2} \cdot \frac{7}{15} = \frac{7}{30}$

a. $\frac{1}{12}$ c. $\frac{1}{4}$

(b.) $\frac{7}{30}$ d. $\frac{25}{256}$

Evaluate the factorial expression.

3. $\frac{10!}{4! \cdot 5!} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5!}{4! \, 5!} = \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6}{4 \cdot 3 \cdot 2 \cdot 1} = 10 \cdot 9 \cdot 2 \cdot 7 = 1260$

a. 0 (b.) 1260 c. 2880 d. 3,628,800

4. $\frac{9!}{4!} = \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4!}{4!} = 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 = 15120$

a. 24 b. 0 c. 362,880 (d.) 15,120

5. A six-sided die is rolled 90 times. Two comes up 17 times.

a. What is the theoretical probability of rolling a two? $\frac{1}{6}$

b. What is the experimental probability of rolling a two? $\frac{17}{90}$

6. Write the **expression** represented by ${}_6C_2$ $\frac{6!}{(6-2)!\,2!}$

7. A survey found that 45% of teenagers have a younger sibling. You randomly survey 4 teenagers. Calculate the probability of selecting "k" teenagers who have a younger sibling.

Use the formula: P(k successes) = ${}_nC_k p^k (1 - p)^{n-k}$

where n = # independent trials, p = probability of success, and k = # successes.

P(k = 0) = ${}_4C_0 (0.45)^0 (0.55)^4 \approx 0.0915$ ${}_4C_0 = 1$

P(k = 1) = ${}_4C_1 (0.45)^1 (0.55)^3 \approx 0.299$ ${}_4C_1 = 4$

P(k = 2) = ${}_4C_2 (0.45)^2 (0.55)^2 \approx 0.368$ ${}_4C_2 = 6$

P(k = 3) = ${}_4C_3 (0.45)^3 (0.55)^1 \approx 0.200$ ${}_4C_3 = 4$

P(k = 4) = ${}_4C_4 (0.45)^4 (0.55)^0 \approx 0.041$ ${}_4C_4 = 1$

8. Eight balls numbered from 1 to 8 are placed in an urn. If one ball is selected at random, find the probability that it is not number 4.

a. $\frac{1}{2}$ b. $\frac{1}{8}$ c. $\frac{3}{4}$ (d.) $\frac{7}{8}$

You spin a spinner divided into nine equal parts numbered 1 through 9. Tell whether the events are *disjoint* or *overlapping*. Then find *P(A or B)*.

A = 2, 4, 6, 8
B = 3, 6, 9

9. **Event A:** Spinner stops on an even number.
Event B: Spinner stops on a multiple of 3.

overlapping

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = \frac{4}{9} + \frac{3}{9} - \frac{1}{9} = \frac{6}{9} = \frac{2}{3}$

10. How many different ways can you arrange five people shoulder-to-shoulder in a line?

$5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$ ways

11. A lunch menu consists of 5 different kinds of sandwiches, 3 different kinds of soup, and 5 different drinks. How many choices are there for ordering a sandwich, a bowl of soup, and a drink?

a. 3 (b.) 75 c. 13 d. 86,400

$5 \cdot 3 \cdot 5 = 75$

Find the number of combinations.

12. ${}_4C_3$ $\frac{4!}{(4-3)!3!} = \frac{4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 2 \cdot 1} = 4$

13. Find the probability $P(3 \text{ or } 4)$ when a fair die is rolled.

$\frac{2}{6} = \frac{1}{3}$

14. Here are the points scored by the Culver Eagles in their basketball games this year.

Home: 86, 81, 78, 94, 80, 69, 82, 49, 93, 87, 90 min = 49 max = 94

Away: 71, 65, 57, 84, 69, 67, 59, 72, 58, 64, 68 min = 57 max = 84

a. Find the mean, median, range, and standard deviation for the points scored during the Eagles' home games this year. mean = 80.8 med = 82 range = 45 $\sigma = 12.2$

b. Find the mean, median, range, and standard deviation for the points scored during the Eagles' away games this year. mean = 66.7 med = 67 range = 27 $\sigma = 7.34$

c. Compare the statistics for home and away games. What can you conclude?

They scored, in general, more points at home than away; mean & median both higher. They were more consistent AWAY; range and standard deviation are smaller.

15. The mean age of the employees at a company is 40. The standard deviation of the ages is 3. Suppose the same people were working for the company 5 years ago. What were the mean and the standard deviation of their ages then?

mean = 40 − 5 = 35

st. dev = 3

16. The table below shows the price of an individual pizza at five different airports.

Chicago (O'Hare)	\$4.02
San Francisco	\$4.96
New York (JFK)	\$6.30
Los Angeles	\$5.82
Denver	\$4.67

a. Find the mean and median of the pizza prices.

mean = 5.15 med = 4.96

b. Find the range and standard deviation of the pizza prices.

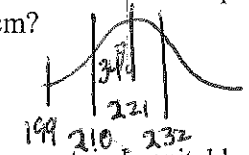
range = 2.28 σ = 0.814

c. 10% sales tax is added to the price of each pizza. Use what you know about multiplying each value in a data set by a constant to find the mean, median, range, and standard deviation of the total costs of the pizzas.

mean = (1.1)(5.15) = 5.67
med = (1.1)(4.96) = 5.46
range = (1.1)(2.28) = 2.51
σ = (1.1)(0.814) = 0.8954

17. Last year, the personal best high jumps of track athletes in a nearby state were normally distributed with a mean of 221 cm and a standard deviation of 11 cm. What is the probability that a randomly selected high jumper has a personal best between 199 and 210 cm?

13.5%



18. The duration of routine operations in a certain hospital has approximately a normal distribution with an average of 125 minutes and a standard deviation of 15 minutes. What percentage of operations last longer than 155 minutes?

110 125 140 155 170
34 34 13.5
2.5%
2.34 0.15

19. The class average on a test was 85, with a standard deviation of 3.8. Find the probability that a student received at least a 76 on the test.

$\frac{76-85}{3.8} = -2.4$

2 scores. $P(X \leq 76) = .0082$ so $P(X \geq 76) = 0.9918$